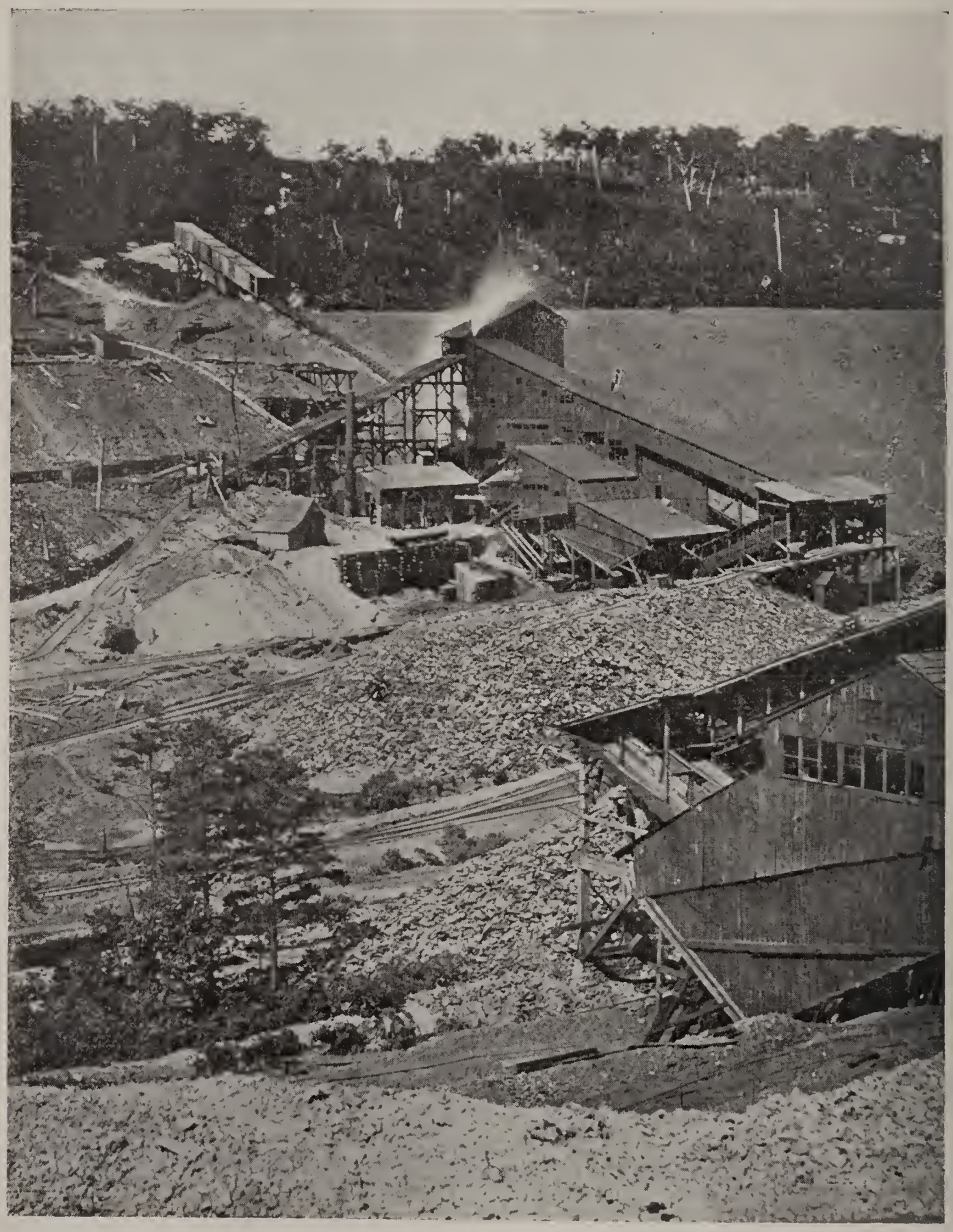
ANTHRACITE COAL PRODUCTION

Changes in the Industry that Have Made it "Not Alone a Mining Proposition, but a Manufacturing and Commercial Undertaking as Well."

REPRINTED FROM
THE COAL TRADE JOURNAL
NEW YORK
1907

Anthracite Coal Production

Passing of the Man with the Pick and Shovel—Demand More Exacting; Pure Coal Scarcer—Uncertainty of Early Conditions—Thin Seams Now the Rule—Large Allowance for Waste Labor—Cleaning and Separation—Taking out the "Bone"—Problem of Waste Disposal—Keeping Mines Free of Water—Labor's Large Share of Increased Mining Cost.



AN ANTHRACITE COLLIERY

Hard Coal "must now go through processes almost as costly and complicated as the milling of flour from wheat."

It is hard for the practical miner to believe that coal is the result of vegetable decomposition, for wherever there is a layer of coal over bone, there is never a clean parting between the layers, such as happens between coal and slate. If coal is decomposed vegetable matter, the miner cannot understand why a layer of it sticks so closely to one material and parts so readily from another.

Large Allowance For Waste Labor

On account of the difficulty the miner has in separating coal from refuse, he is allowed to load a certain amount of waste in the mine car, generally not over 800 pounds. The fact again that each miner has to blast down two to three feet of rock from the roof, so as to make way for the mine cars; results in the mixing of a lot of slate with the coal in sizes so small that they must go to the breaker to be cleaned. Here an automatic picker, in the form of open slots at regular intervals, allows the coal to pass over, but gathers in the heavier slate. When coal to be cleaned is wet, "jigging" is resorted to in order to wash the fuel clean from mud and dirt.

The miner may obtain from five to ten cars for each keg of powder, which costs him $1.50 a keg, unless he is compelled to use dynamite, which costs $2.75 for a box of twenty-five pounds, and while fifteen years ago he was able to mine six cars in a shift he is now, owing to the thinness of the seams, able to produce no more than three and a half cars in a shift, for which he will be paid about $3.75. After he had paid his laborer $2 and supplies out of this sum he would have only about a dollar left, and so to make his compensation adequate the coal operator has to pay "rib yardage" as well as for blasting down top rock. All this increases the yardage cost to the coal company about thirty-five cents a ton, as against the cost of only four or five cents fifteen years ago. The labor cost per ton of coal is now not far from $1.80.

Cleaning and Separation

After the miner has done his part the coal is loaded into mine cars. It is a mixture of all sizes, from lumps of 100 pounds to the finest culm. From the mine depths it is hauled to the foot

of the shaft, hoisted to the surface, transported to the breaker, and there again hoisted from 100 to 150 feet and discharged from the car. Grates of iron separate the large and small pieces. The refuse is removed, crushers reduce the large chunks, screens or shakers make a still further separation into various sizes. These are now run over a series of automatic pickers which are supposed to remove the "bone" and slate refuse.

But black "bone" is very difficult to remove from coal, owing to their weights being so nearly the same, and fifty per cent. of the coal and refuse has to be run over pickers two or three times before it is pure enough to come up to the standard required by the market. After it has gone through all these washings, jiggings and separations, the coal is now ready to go into the cars that scatter it the country over.

Taking Out The "Bone"

This is hardly half the story of the intricate processes through which Anthracite must pass before it becomes the fuel of commerce. The fifty per cent. of the coal that is generally wet and slimy must go into a series of jigs, one for each size of coal from "egg" down to "buckwheat," and all costing large sums to construct. In these jigs is the greatest difficulty of dividing slate and "bone" from the coal.

The water in the jigs, rising and falling by the action of a plunger, drives the coal to the surface, while the rock is deposited at the bottom. This makes the operation comparatively easy when only rock and coal are to be separated, but the greatest quantity of the refuse found in coal is "bone," the relative density of which is so nearly the same as coal that in water it floats to the surface with the carbon. The jig, therefore, is useful only in the elimination of rock or slate; another means must be resorted to to relieve the coal of its "bone" impurities. For this purpose a spiral slate picker is employed; this means, of course, that many different kinds of pickers have to be operated in the same breaker.

Owing to the poor quality of the majority of coal seams now in operation, the quantity of small sizes, below "chestnut" coal, naturally increased, and the operators have to make a corresponding increase in the number of pickers and jigs to meet the situation. Again, owing to the number of jigs in operation and the quantity of water necessary on the fine coal screens to wash im-

Anthracite Coal Production

Changes in the industry that have made it "not alone a mining proposition, but a manufacturing and commercial undertaking as well"

No other machinery than a pick and shovel was required in the mining of the first ton of Anthracite coal ever produced. For a long time no more elaborate operations were carried on than would be involved in surface mining or running shallow tunnels. But of late years physical conditions in the hard coal fields and the demands of hard coal consumers have entirely revolutionized the industry. As President Thomas of the Lehigh Valley Railroad said in addressing the last annual stockholders' meeting of the company, "It must be borne in mind that the business of producing Anthracite coal is not alone a mining proposition, but a manufacturing and commercial undertaking as well."

In place of the first Anthracite miner with pick and shovel, successful hard coal mining now means shafts from 200 to 2,000 feet deep, collieries that cost as much as $750,000, pumps that can handle 3,500 gallons of water every minute, timbering that costs $5,000,000 a year. The business must be carried on upon a large scale and with almost unlimited capital or not at all.

Demand more exacting;
Pure Coal Scarcer

Besides the difficulties that naturally multiply as the coal deposits go deeper and the seams become thin, there is the necessity to produce fuel that will satisfy demands that are more exacting every year, although pure Anthracite in its natural state is at the same time becoming scarcer and scarcer. Fifteen years ago a large percentage of Anthracite went on the market as lump coal. Now hardly three per cent. is consumed in that form. Domestic demand steadily increases and this means that coal must go through processes almost as costly and complicated as the milling of flour from wheat.

In the days when seams of coal ran from six to twelve feet and in some localities twenty-four feet thick, a good miner could go into his chamber in the morning, drill and blast a few hours and then his work was done. He had mined enough coal to load

his allotted number of cars, say six, containing about eighty cubic feet each. The miner was paid about 90 cents a car, and after deducting what his laborer received and what it cost him for powder and other supplies, he had left about $3—a fair average daily earning.

Uncertainty Marked
Early Conditions

But because the market for Anthracite was so small that continuous production was impossible, the costs of operation were heavy, and neither the miner nor the operator made much money. Whenever the labor cost per ton exceeded a dollar there was nothing left for interest on capital. As a matter of fact, if lumber and machinery had not been comparatively cheap, and if the old royalties had not been much lower than those of the present day, few of the coal companies could have kept out of bankruptcy. As it was, many individual companies had to sell out to large corporations having command of the capital required. And this was true, in spite of the fact that the seams of coal in operation fifteen years ago were so free from impurities that the automatic slate picker was rarely necessary in the preparation of coal of the required standard for market.

Thin Seams
Now the Rule

To-day a very different condition of affairs prevails in the industry whose product heats the homes and cooks the food of millions of people. Instead of seams running from six to twenty-four feet, most of those now being worked run from thirty inches to four and one-half feet, and the majority of these seams are full of impurities. It is common nowadays to find seams of three or four feet in thickness that "blow," as the miners express it, in two or three benches.

There will be a layer of coal perhaps ten inches thick, then fifteen inches of black "bone," then another thinner layer of coal, then a tier of slate, a thinner tier of coal, more "bone," and finally, perhaps, six inches more of coal. The "bone" adheres to the coal and it is very difficult to separate them at the top, so that when the miner fires a blast he is likely to bring down the top benches and leave the bottom ones unmolested. To dislodge them more blasts are required, and then it is necessary to separate the bone refuse from the coal with a pick.

purities away and to take care of the culm passing through the smallest mesh in the screens, the problem of disposing of the resulting culm slush became more difficult and more expensive.

Problem of Refuse Disposal

At first the culm was deposited wherever there was space for it near the breakers. This method of disposal soon amounted to a great nuisance and it was finally decided to return the refuse material to the mines, depositing it wherever possible in old worked-out chambers. This protects the pillars left behind and helps to avoid cave-ins. To return the refuse to the mines, however, was by no means a simple process. Holes had to be bored from the surface to the seam. These holes vary in size from four to twelve inches, and have to be double cased and cemented between two lines of pipes, varying in depth from 200 to 800 feet. At the underground end, pipe lines have to be connected. Some of these lines are 5,000 feet long from the foot of the bore-hole and deposit the refuse at a height of 100 feet above the bottom elevation.

The life of the refuse pipes depends upon the quantity of water and culm passing through them per minute and the amount of acid the water contains, but in no case do they last long, although their installation involves a large outlay. The additional cost to the coal companies in this department of culm disposal is at least 300 per cent. in excess of what it was fifteen years ago, and when the increased quantity of water required is taken into consideration, no great exercise of the imagination is necessary to realize the huge additional cost thus incurred.

Small Sea of Water Pumped from Mines Daily

In addition to all these expenses, there is the cost of keeping the mines free from water. Over half a billion gallons of water must be pumped out of the Anthracite mines of Pennsylvania every day. The exact daily average for 1905 was 633,000,000 gallons. Mines may be shut down and coal production suspended, but the water flows on forever, and the battle with it must ever be kept up. In some mines forty tons of water must be pumped out for every ton of coal produced, and when the water is brought to the surface it is often necessary to construct expen-

sive aqueducts to carry it off. At a Hazleton shaft a wooden canal three and one-half miles long had to be built to carry the water away.

Large power requirements at the mines to operate the pumps, breakers and other machinery eat up over 6,000,000 tons of coal a year. As much as twenty-five per cent. of the entire coal production of some mines is so utilized. Steam with which to operate shaft and slope engines is forced through more than 100 miles of piping. Altogether it is estimated that 470,000 horsepower has to be produced at the mines.

Increased wages and the increased force necessary to do the same amount of work have also added greatly to the expense of the production of Anthracite. Since 1900 the miners have received an increase of wages equal to twenty per cent., and with the sliding scale they are now getting about twenty-five per cent. more than they received seven years ago. Sixty per cent. is a conservative estimate of the increased cost of producing coal today as compared to fifteen years ago.

Labor Gets 91 Per Cent.
Of Increased Mining Cost

In 1906 when the effect of the Anthracite Strike Commission award had been fully demonstrated, President David Willcox, of the Delaware & Hudson Co., showed that on the basis of a production of 61,410,201 tons, "the increase in cost of production over 1901 was 36.77 cents per ton, or $22,580,530.90. Of this 33.66 cents per ton, or $20,670,673.66, were paid to labor. The increase in amount realized was 37.57 cents per ton, or $23,071,812.52. Of this increase the cost of production absorbed $22,580,530.90 and $491,281.62 remained. The increase in price was, therefore, 37.57 cents per ton, which was distributed as follows: Labor, 33.66 cents; materials, supplies and royalties, 3.11 cents; capital, 0.8 cents."

Old leases have expired and coal lands can now be obtained only by paying very much higher premiums than formerly prevailed.

Of course, if the mine owner has to pay more for his raw material, more for wages, more for power, more for timbering, the price of coal must inevitably increase, although economies in operation have prevented so far an increase in price to consumers equal to the increase in the cost of production.